

RECENTLY PATENTED INVENTIONS.

Engineering.

STEAM STEERING GEAR.—John Russell, Long Island City, N. Y. In accordance with this invention a steam cylinder is held on suitable supports, which also serve as guides for piston rods, ports leading into opposite ends of the cylinder from a steam chest. The piston rods are each connected with a crosshead carrying a pulley over which a tiller rope extends, the tiller ropes being arranged at each end of the cylinder, so that both ropes will move together, while the steersman operates the wheel just as if he were steering by hand, it being necessary to keep throwing it in order to keep the steam port of the cylinder open for the inlet of steam.

BOILER AND PIPE COVERING.—Robert S. Miller, Wilmington, Del. This is an elastic composition, to be put on in two coats, made of refined or washed kaolin, cow or goat hair, asbestos fiber, feldspar, plaster of Paris, rag pulp, etc., with water. The making and application of the composition, as described by the inventor, varies somewhat, but full instructions are given. It is designed to be fireproof and to cling close where applied without straps, while it is also an anti-rust, odorless and waterproof covering, a good non-conductor, and takes a high polish.

COATING COMPOSITION FOR PIPES, ETC.—This is another invention of the same inventor for a coating or outside finish to various or any special plastic coverings of steam pipes, boilers, and other water-tight and non-conducting surfaces. This coating saves the expense of putting on canvas or other similar outside coverings, and can be washed clean and highly polished, not being affected by changes of temperature.

Railway Appliances.

CAR COUPLING.—Charles J. Knighton, Jr., Birmingham, Ala. The coupling hook, according to this invention, is pivoted within the drawhead, and has a curved rear end, upon which bears a cam-shaped block attached to a rockshaft journaled in lugs or brackets and extending across the end of the car, there being an arm near each end of the shaft on which is a weight. The improvement is designed to afford an automatic coupler of few and simple parts which can be employed with all varieties of link couplers, and with which uncoupling is effected from the sides of the car.

DUMPING CAR.—Paul E. Glafcke, Cheyenne, Wyoming. This car is arranged to dump automatically when the door is unlocked, discharging the load in any desired direction, while the construction is designed to be simple and durable. The wheeled truck has a notched circular plate, between which and the turntable turns a friction plate, the receptacle on the turntable having an inclined bottom and flaring sides, with a door at its open end, while an arm pivoted on the frame engages the notches in the plate. A rod extends from the door to the opposite end of the car, whereby the latch may be released and the door locked in open position from one end of the car.

FLOOR FOR CATTLE CARS.—Ferdinand M. Canda, New York City. This invention provides a floor constructed of alternating high and low boards, forming spaced raised parts integral with the flooring boards, in order to give a proper footing to the cattle, the raised parts thus formed not being liable to be broken off by the cattle, or by the use of the car for carrying miscellaneous freight.

Mechanical Appliances.

GRINDING MACHINE.—Ivor R. Titus, Huntington, West Va. This is a simple and efficient machine for grinding the peripheries of car wheels, and has a rigid frame carrying a spider provided with three guiding rolls, one of which is furnished with a clutch to engage the flange of a wheel and rotate it during the grinding, while the grinding mechanism has a laterally and vertically adjustable wheel. Combined with the grinding machine is a crane for lifting and placing the wheel in the machine, while the turret has a cover which excludes grit and dust from the gearing and the bearings of the shaft.

BALF TIE MACHINE.—Wilbur E. Gladding, Rantoul, Kansas. This is designed to be a durable and efficient machine for making balf ties of wire, also straightening the wire, and the balf ties being rapidly and nicely formed. The head stock of the machine has a bent arm extending above the machine frame, and a revoluble and longitudinally movable shaft is mounted in the stock, on an arm of which is pivoted a split lever adapted to swing over the shaft, while a pair of spring arms provided with guide feet is pivoted in front of the lever.

HAIR WORKING MACHINE.—George A. Williams, San Diego, Cal. This machine comprises a series of swinging needle bars having hooked needles at their lower ends, a series of movable shuttles arranged opposite the needles, a cloth-carrying carriage projecting between the needles and shuttles, and a lever mechanism for simultaneously actuating the needles, shuttles and carriage, with various other novel features. The machine is designed to automatically draw hair through a web of loose cloth or other material, and knot the hair so that it cannot get loose, while it may also be used for securing any fibrous material instead of hair to any suitable web or body.

Miscellaneous.

COIN OPERATED PHOTOGRAPH MACHINE.—Pierre V. W. Welsh, New York City. This machine has a vertically adjustable case to carry the lens, adjacent to which is a mirror, while there is a shutter for the lens, behind and below which are developing and fixing chambers, a swinging plate holder being pivoted behind the lens and above the chambers, at the bottom of which are slotted valves, and a coin-operated mechanism is provided for moving the shutter, plate holder and valves. One whose picture is to be

taken moves the case until his eyes appear in the mirror, then drops a coin in the slot, and a clockwork mechanism sets the machine in operation, the picture when completed dropping through a chute upon a tray. An electric light and flash light mechanism are also provided for taking pictures at night.

DENTISTS' RUBBER DAM CLAMP.—Christian A. Meister, Allentown, Pa. The jaws of the clamp to hold a rubber dam in position around a tooth are by this invention provided with simple levers or fingers, not pivoted together as a separate instrument, but arranged to project beyond the spring portion of the clamp, whereby the clamp may be readily opened or manipulated. These fingers may be either permanent attachments to the jaws of the clamp or removable, being in the latter case loosely connected by a light chain, so that they will not be lost.

SIPHON.—Jacob Singer, New York City. This is a simple device, automatic in operation, at all times ready for drawing liquids without requiring pumping or refilling. It consists of a bent tube having at each end a head adapted to form a liquid seal for the ends of the tube, a faucet being arranged in the discharge head to facilitate drawing off liquid by the siphon as desired, while the inlet head has perforations to admit the liquid. The latter head is removed when the siphon is filled with a liquid similar to that to be drawn, previous to placing it in position for use.

SEAL LOCK.—Sidney T. Nickerson, Topeka, Kansas. This invention relates especially to devices for locking and sealing railway car doors, and also applicable to other purposes, as the sealing of chests, room doors, lockers, etc. The ordinary wire and lead seal may be used and a frangible seal, with this improvement, or either may be used separately, and the seal applied in much quicker time than usual. The frangible seal, preferably bearing the initials of the company using it and a number, is more readily seen at night when taking car records than the lead seal, and the seal mechanism cannot be picked or the door opened without breaking the seal.

PERMUTATION PADLOCK.—William M. Brooke, Brooklyn, N. Y. This lock has a two-part case, one compartment of which is open at one side and at the top and has a series of tumblers, while the other has an internal shoulder, the staple to enter the case having one member provided with teeth to engage the tumblers and the other with a spring catch to engage the shoulder. When the locking staple is removed the cover can be easily taken off and the combination changed, but when the staple is in place the tumblers cannot be reached. To insert the staple and fasten the lock it is only necessary to push both members of the staple to place, regardless of the position of the tumblers. The construction is designed to be strong and inexpensive.

LOCK.—Alvin F. Harrison, Greeley, Kansas. In the case of this lock is a keeper plate having an outer and inner recess, a sliding latch bolt and a sliding supplementary bolt with fingers, one of which has a tooth to engage teeth on the lock case, while a link pivoted in the case has its ends pivoted to both bolts. The lock is designed to be simple and durable, operates without springs, and is adapted for use as night lock as well as a day lock, having means for being operated from the inside without a key.

SEWING MACHINE ATTACHMENT.—Anthony B. McDowell, Edna, Texas. This is a grinding attachment which can be quickly made fast to the fly or hand wheel of the machine, for the sharpening of needles, scissors, knives, etc. It has a barrel portion with a central socket into which the hub of the wheel fits and radial spring clamp arms with curved ends to slip over the edge of the wheel, the barrel forming a spindle for an emery or other grinding wheel. The attachment can be quickly put on and taken off, and is simple and cheap in construction.

TROUSERS PROTECTOR.—Oscar Jonach, New York City. This is a shield for the lower edges of pantaloons, adapted to be quickly attached or removed, none of the attaching devices being visible from the exterior, and the cloth fitting snugly to the shield. The shield is semicircular, made of sheet metal, celluloid, hard rubber, or other suitable substance, and has a slight flange at the bottom to extend below the lower edge of the garment, while at its ends are slightly curved needles to enter the hem at the inner sides, and at the center of the shield at the back is a hook, to be also attached to the hem. The natural elasticity of the cloth is not materially interfered with by the attachment of the device.

ROCKING CHAIR.—James T. Mitchell, Monticello, N. Y. This is a platform rocker designed to give a gliding rocking movement to the chair body and dispense with the use of springs. There are segmental surfaces on the lower edge of each side of the chair body and a pair of rollers on each side of the base, one for each segmental surface, while projecting up from the base between the rollers are brackets also carrying rollers traveling in tracks on the chair body. The chair and its platform are by this construction effectively connected, and the roller connection is such that the chair has an easy movement, with a minimum of friction.

SAND SCOW.—William Osborn, Duluth, Minn. This scow has hopper-like sand compartments at each end and between them a water compartment in which is located a suction device. The bulkheads which form the end walls of the water compartment have vertically sliding gates, a suction pipe being adapted to be moved through the gateway, while there may be a track on the deck of the scow to support a carriage on which the suction pipe is moved, although the improvement may be applied to a vessel without a deck. The suction pipe is connected to any approved pattern of sand or other pumps.

FLUSHING DEVICE.—John C. Spencer, Anniston, Ala. This is an automatically operating flushing arrangement, connected with the tank supplied with the water necessary for flushing, whereby, as the water rises in the tank, by means of floats, valves, and levers, a portion will be intermittently discharged suffi-

cient to do effective work in flushing. The construction is simple and the action positive, no matter what is the condition of the water in the tank, nor how slow the supply.

METAL SOIL PIPE.—Robert C. Black, St. Paul, Minn. This pipe has a cleaning chamber with annular shoulders at its ends and a lateral opening, a removable cover with a threaded aperture for connection with a test pipe, a detachable plug adapted to close communication between the chamber and one end of the pipe, and various other novel features. The construction is such that the pipe may be thoroughly, quickly and conveniently cleaned, and heavier rods and scrapers may be employed with it than has heretofore been customary.

HOE, PICK AND SHOVEL.—James W. Hurst, Hotchkiss, Col. This is a combination implement, embracing in one device all three of the tools named, the parts being so made that they can be conveniently and compactly arranged, and the tool quickly and easily changed from one implement to another, the devices not in use not interfering with the use of the one it is desired to employ. The lower end of the handle is bifurcated and in it is pivoted the tang of the shovel, the tang extending enough beyond the pivotal point to constitute a pick, and the arrangement being such that the shovel can be locked in position as a hoe, as its tang is fixed in the position of a pick.

HAM COVER.—Wilhelm Wohltmann, New York City. A covering sheet of suitable fabric is arranged to inclose the ham, the sides of the sheet overlapping one another, while a series of buckle straps is arranged on the back of the sheet to close it over the ham. On one end of the sheet is a draw string and on its other end is an elastic to close the ends of the sheet, to protect the ham from dust, insects, etc.

DESIGN FOR A BADGE.—George Big-nell, Cheyenne, Wyoming. This is a political design, consisting of a shield and superposed banner mounted on the face of the shield.

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6. View of the Drexel Institute of Art, Science, and Industry, recently erected at Philadelphia, at a cost of \$600,000.
7. The Parsonage of the First Baptist Church at Gardner, Maine. Cost \$2,500 complete. Perspective and floor plans.
8. Ground plan and perspective view of the First Baptist Church recently erected at Gardner, Me. Cost complete, \$8,000.
9. A residence at Bridgeport, Conn. Cost complete \$3,400. Perspective and plans.
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12. The beautiful residence of Geo. C. Hollister, Esq., at Rochester, N. Y. Mr. James Cutler, architect.
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Notes & Queries

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(3838) C. H. B. says: Supposing there to be a stream of water filling a 36 in. pipe, flowing from 40 ft. to 50 ft. per minute, and having a fall of 300 ft. approximately, what would be the relative power that could be developed by a single undershot wheel, and by a series of overshot wheels, say of 24 ft. diameter, so placed as to utilize as far as possible the entire fall of 300 ft.? A. The total value of your stream as stated is 157 horse power. You can utilize of this power by the best impact wheels about 130 horse power. With an overshot wheel of 24 ft. diameter, you have little or no benefit from the great height, and can realize little better than 15 horse power. With a common undershot wheel, in which you may make the impact from the pressure in the pipe available, you may realize 50 horse power.

(3839) H. A. asks: 1. If there is any one at present experimenting with casked cast iron pipes for the use of steam. If so, what is the result? A. Cast iron pipe with casked joints is not used for steam at any pressure. It does not remain tight but a short time, owing to expansion and contraction by the heat of the steam. 2. Will a 4 m. cast iron pipe as above stated stand a pressure from 10 to 25 lb.? If not, what is your idea of making use of the said pipes for the circulation of steam? A. The pipe will stand the pressure, but the joints work loose when made with lead. Would stand better, if with rust joints, for a short time. Thin cast iron pipe of this class with rust joints is used for hot water heating when there is but slight pressure.

(3840) J. Q. D. asks: 1. Have locks ever been constructed in the mouth of tidewater streams where the water was not at low tide sufficient for large vessels to navigate, in order to retain a uniform depth of water, and also to prevent the current that so much retards the speed of boats, both going in and coming

out to sea? A. The slack water navigation of streams has been long in use, of which the navigation of the Schuylkill River, from Philadelphia to Pottsville, is a notable example. The Sault Ste. Mary Canal is also an example. Tide locks have also been long used in the United States for ordinary canal purposes, and in England for the largest ships. 2. Is there any geographical reason why such locks could not be built in the mouth of the James River, at some suitable place above Newport News, and thus form a motionless level of over 100 miles, and gain at least 4 ft. of water as against low tide? A. There is no reason that we know of to prevent the James River being made navigable by slack water, except the rights of riparian owners. 3. What is an approximate estimate of miles of navigable streams in this country, that could be so improved? A. There are thousands of miles of streams in the United States that could thus be made navigable as well as a source of power. Railroad competition seems now to be a bar to this class of improvements.

(3941) N. M. W. asks: 1. What size and quantity of silk covered magnet wire should be used on a Bell telephone, and to what resistance would? A. Use enough No. 36 wire to bring the resistance up to 150 ohms. 2. Would No. 32 cotton covered do, and what amount of it, and resistance? A. No. 32 will not answer so well. 3. What number in American or Brown and Sharp gauge corresponds to No. 36 B. W. G., which I have been told to use on my telephones? A. No. 35 American gauge corresponds to No. 36 B. W. G. 4. I have some $\frac{3}{4}$ in. by 6 in. steel magnets, very strong. Are they of proper size? A. Yes. 5. My diaphragms are of common tin type plate. Is this proper, or should they be thinner? Diameter of diaphragms, $\frac{3}{4}$ in.; diameter of speaking hole, $1\frac{1}{2}$ in. How far from end of magnet should diaphragm be placed? Where can I get very thin iron or steel for diaphragms? A. Tin type plates will answer for diaphragms. You can get thin tin type plates from dealers in photographic supplies. 6. What dimensions are best for bobbin? Distance from diaphragm to bottom of box about six or seven-eighths of an inch. A. It is not very material. Consult SUPPLEMENT, No. 140. 7. What has become of the "House" telephone, which you described in the SCIENTIFIC AMERICAN some years ago? I think you stated that it would be put on the market. A. We do not know that anything is being done with it. 8. How long a line could be operated with above telephone, without battery, and if battery were used, of what kind should it be, and how connected? A. On a line unaffected by induction, you can probably secure fair results for a distance of from two to three miles. 9. When size of wire is given, without specifying, is the American gauge implied? A. Yes. 10. I have some one quart bichromate of potassa batteries, and some of the carbons are broken, and I wish to replace them myself. They are fixed in brass plates, which have raised pieces running across them on each side of carbon. The carbon seems to be fastened in with lead. Please tell me how it is done. Carbons $1\frac{1}{2}$ by 6 in. A. The lead is cast upon the ends of the carbons.

(3842) C. B. says: Can you tell me how to clean brass rifle shells so that they can be reloaded? When I try to clean them with soda it forms a corrosive substance on the inside and outside. A. The corrosive substance was on the shells at first, the soda only dissolving the acid portions. Try a solution of oxalic acid in hot water for a few minutes; after washing with soda, wipe inside and outside with a swab on a stick and finish with a soda wash.

(3843) M. S. asks: 1. Can I get the same amount of power from the simple electric motor, page 498, "Experimental Science," with 6 cells of Fuller battery, as I could if it was made so small as to give its maximum amount of power with 6 F. cells? A. You can always secure the best results by having the motor proportioned to the battery. 2. How much smaller would it have to be made, also how much and what sizes of wire should be used? A. Make the motor about half the size given, and wind it with No. 20 wire. 3. In either case would the 6 cells develop enough power to run a sewing machine? If not, how many would? A. No; six cells of Fuller battery will not run a sewing machine. It will require double that number. 4. How can I, when using Fuller cells, cause the motor to run fast or slow, as when running a sewing machine? A. You can vary the speed of the motor by introducing resistance into the circuit or removing it therefrom. 5. My Fuller battery has been set up two weeks and the zincs, which are Leclanche battery zincs, are just about used up. They were amalgamated and the ends immersed in mercury in the porous cups, which are second hand Leclanche porous cups. The solution used was a saturated solution of bichromate of potass, with 10 per cent of sulphuric acid outside porous cup, water inside. The work done by the battery during that time was to light a four candle power lamp one hour and a quarter and to light gas. Shouldn't the zincs have lasted longer? And can you suggest a remedy for the wasting of the zincs? A. Leclanche zincs are too small for the Fuller battery. The zincs should weigh from 1 to 2 pounds each. Use pure zincs and plenty of mercury.

(3844) J. M. says: 1. Suppose a pound of lead and the same weight of wood were dropped from a height of two hundred feet at the same instant, how much difference would there be when the lead reached the ground? If a piece of lead and a piece of wood the same size were dropped from the same height at the same instant would there be any difference between them or would one reach the ground before the other? A. There will be a very great difference in the first case, not so much so in the second case. The friction of the air would retard the fall in proportion to the relative weights and bulk. In the first case the weights will be alike, but the bulk of the wood will largely exceed the lead and furnish a larger area to the resistance of the air. In the second case, the size being the same, the difference in weight will give the lead about fifteen times greater weight, while the resistance of the air is the same with both wood and lead. It is only in a vacuum that the fall would be alike.

(3845) G. W. H. says: Please inform me if there is, and how to make, a paint to be applied inside a tin vessel to prevent it rusting, vessel to con-

tain rain water? A. Paint the pail with red oxide of iron paint mixed with boiled linseed oil, two coats, dry each in the sun, or if you desire a fine finish use Japan baking varnish of any dark color and bake in an oven at about 260° temperature.

(3846) W. F. B. asks: 1. Can a low pressure engine be worked with success receiving steam direct from high pressure engine without steam jacket? A. The two engines as described can be run as a compound engine if properly arranged. 2. What would be the horse power of a compound engine, high pressure cylinder 16x24 in., low pressure 24x24 in., speed of engine 100 revolutions per minute, steam pressure 150 pounds? A. They should develop from 400 to 450 horse power. 3. What is the width of a locomotive fire box and water space when such is inside of frame? A. Width of fire box, about 4 feet 4 inches; water space of legs, 4 inches.

(3847) S. A. K. says: I have 15 pounds of water at a temperature of 60° Fah., and add 2 pounds of steam. What will be the temperature of the mixture? Would there be any difference if I add the same quantity of boiling water instead of the steam? If so, why? A. As you do not mention the pressure of steam, which makes some difference in the result, we assume 5 pounds pressure, which will give you a temperature of 205°, while with boiling water the temperature of the mixture will be but 80°. With steam you add the latent heat of steam, or 950° for each pound of steam.

(3848) J. L. C. asks: Can I construct a battery which will generate electricity enough to supply three incandescent lights, and also how many cells and what size will I have to use? A. It depends entirely upon the size of the incandescent lights. You can run three or six 20 volt lamps with 11 cells of storage battery, and you can charge the storage battery with gravity batteries, using four cells of gravity to each cell of storage. We do not advocate the use of primary batteries for practical electric lighting.

(3849) H. asks: 1. What pressure per square inch would air have if reduced $\frac{1}{4}$ its volume at sea level, to $\frac{1}{4}$ to $\frac{1}{2}$? A. 15 pounds, 105 pounds. 2. Give formula to find pressure at various stages of compression. A. For isothermal compression

the formula is $\frac{P}{P_0} = \frac{V_0}{V}$ — P = gauge pressure. P_0 = absolute pressure of the atmosphere or 15 pounds. For example:

$$\frac{15}{15} = 15 \text{ pounds gauge pressure}$$

$$\frac{15}{15} = 15 \text{ pounds gauge pressure.}$$

(3850) D. C. S. says: Being an old subscriber to the SCIENTIFIC AMERICAN, I would like to ask your opinion in regard to the use of a steam boiler in use here; the boiler in question is of steel plate, $\frac{1}{2}$ inch thick, 12 feet long, 60 in. diameter, with thirty-nine 3 inch tubes, return, and the take-up is over the furnace doors, and has the old style safety valve with a round iron ball as weight on lever arm. The proprietors when ready to start found the engine unable to drive the mill with the weight at the end of safety valve lever, and so they added a 56 pound pea to same, and yet had to add 4 fire bricks to end of lever before the pressure was able to drive the mill. Some claim this to be dangerous, as the ball weight on end of lever is the full capacity of boiler; with all this weight, the steam gauge only shows 100 lb. pressure, and is all the time giving trouble by leaking, etc., and needing repairs, etc. A. This is an example of the dangerous practices resorted to in order to get more work from a boiler than is due to its safe capacity. The very fact of its leaking at 100 lb. pressure shows that it is overstrained. This is the cause of many boiler explosions, and should not be tolerated by engineers.

(3851) J. F. asks if an induction coil can be made with which to light a 16 candle power Edison's incandescent lamp. If so, please give length and diameter of core, size and amount of wire for primary and secondary coils, and number of layers of each. Have 40 jars gravity battery which can be used to furnish primary current. A. An ordinary induction coil will not light an incandescent lamp, as the secondary current generated by such a coil is of very high E. M. F. with low amperage. The induction coils used for operating incandescent lamps, and known as transformers, are designed for converting a current of high E. M. F. and low amperage, into a current of low E. M. F. and higher amperage, capable of heating the carbon filaments of the lamps to incandescence. The only way you can utilize your gravity batteries for electric lighting is to use them for charging a secondary battery, employing the latter for operating your lamps. With your 40 jars you can charge 10 cells of secondary battery.

(3852) W. F. C. writes: I have a magazine clipping which I wish to separate, so as to paste both sides in a scrap book. Is there any way to split it and not destroy the paper? A. Cover both sides of the clipping with strong paste, and insert it between two pieces of very strong, smooth paper, making sure to have it attached by every portion of its surface to the pieces of paper. Allow it to dry thoroughly, then pull the stout papers apart; this will split the clipping, and the parts may be soaked off, washed, and pasted in the scrap book.

(3853) W. A. B. asks: 1. Can you give me a good remedy for a sprained wrist? I have tried several remedies, such as liniments, arnica and a band around the wrist, but without cure. A. After the remedies that you have already tried, we can only advise you to consult with a good physician. 2. Should a stone fall from a great height, say 500 feet, does it gain in speed until it reaches the ground, or is the speed of the stone the same after it has fallen a certain number of feet? A. A stone falling from a great height will increase its velocity until the resistance of the air due to its area is equal to the weight of the stone, after which it will fall at nearly uniform velocity, but slowly decreasing as the air increases in density.

(3854) M. J. H. asks: What is the comparative cost of tin, galvanized iron and copper for gutters, and what is the comparative durability of each?

Will they last longer if painted? A. The cost increases in the order named. Copper gutters will outlast tin or galvanized iron many times. All will last longer by being painted every two years. The comparative cost will depend on the thickness of the metal.

(3855) W. J. says: Our old grist mill had 6 runs of stones. These stones were 48 inches diameter and ran 160 revolutions per minute, making a fine quality flour. What amount of power would each stone require? How many bushels of wheat should be ground per stone, or what should be the output of the mill in bushels of wheat ground and in barrels of flour, for one day or twenty-four hours? A. Each stone will require $4\frac{1}{2}$ horse power, and should grind $4\frac{1}{2}$ bushels wheat per hour, making a total output of 645 bushels per day of twenty-four hours, with 27 horse power. This does not include power for elevating and bolting, which will require about 4 horse power.

(3856) J. E. L. says: Could you inform me (a subscriber) what is the trouble in regard to the successful operation of a compressed air motor? Is it caused by the friction of the valves, pistons, etc., and the lubricating of the same, as this might be difficult? I have thought it might prevent their successful operation. In steam and water engines this is not necessary, viz., lubricating to a great extent, that is, of the parts mentioned. A. Compressed air motors are in successful use in Europe for power purposes, and compressed air is used all over the world for running rock-drilling machinery and pumps in mines. There is no difficulty in their use. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 765, 721, 684, on the use of compressed air for power.

(3857) J. H. S. asks: 1. What temperature of air passing through petroleum is necessary to vaporize it? A. Crude petroleum may begin to evolve vapor at 100° F. or less, all depending on the sample. To finish the volatilization a high temperature is needed at the end, and some pitch will be left in the still. 2. What is the highest temperature petroleum gas will stand without ignition, mixed and unmixed, with the proper quantity of air for complete combustion? A. 1,000° to 1,500° F. 3. What heat does petroleum gas produce in burning? A. It depends on the gas or the burner. Theoretically, it might give 4,000° to 5,000° F. Actually, not over half these temperatures should be looked for. In Clark's Gas Engine, \$2 by mail, you will find these theoretical points considered. We also recommend Robinson's Gas and Petroleum Engines, \$5.50.

(3858) A. G. S. and A. T. ask concerning relative merits of shorthand systems. A. It is claimed that Pitman's system is more extensively used than any other shorthand method. We can supply manuals in any system, such as Pitman's "Shorthand or Phonography," 40 cents; *ditto* "Teacher," 10 cents; Munson's "Complete Phonographer," \$1.50; Burnz "Fonic Short hand," \$1; Graham's "Hand Book of Phonography," \$2; Munson's "Phonographic Phrase Book," \$2.50.

(3859) "Danville" asks: 1. What kind of pith is used in making figures for an ano-kano? Will pith out of corn stalks answer the purpose? A. The best pith for the purpose is sunflower stalk pith. The other piths will answer however. 2. Does the box need to be air tight? A. No. 3. Which side of the leather should go out—the black or the red? A. The natural uncolored side of the leather or kid. 4. How much sulphide of tin does it take to put in the pad? A. As much as will spread over its surface. 5. What is the illuminating paint made of? A. From calcium or barium sulphide; see our SUPPLEMENT, Nos. 229, 249, 497 and 539, and the SCIENTIFIC AMERICAN, No. 10, vol. 65, and No. 19, vol 65.

H. H. asks for a varnishing ink.—S. E. N. asks for a varnish for rubber overshoes.—S. R. asks how to dye brown.—C. P. J. asks: Please describe fully the manufacture of enamel signs and sign letters.—J. C. S. asks how to silver glass by solution.—E. D. asks for receipts for engine oils, cylinder oil, axle grease.—J. H. B. and C. H. M. ask for furniture polishes.

Answers to all of the above queries will be found in the "Scientific American Cyclopedia of Receipts, Notes and Queries," to which our correspondents are referred. The advertisement of this book is printed in another column.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequal facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

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